

Geosynchronous Satellite Launch Vehicle



# GSLV-F02

## INSAT-4C MISSION



Indian Space  
Research  
Organisation



## Mission Objective

Launch of INSAT-4C  
into Geosynchronous Transfer Orbit



Liquid Strapon (L40H)



Solid Motor (S139)



GS2 Stage (L37.5H)

## Mission Specifications

Orbit	:	GTO
Perigee	:	$170 \pm 5\text{km}$
Apogee	:	$35975 \pm 675\text{km}$
Inclination	:	$20.71 \pm 0.1 \text{ deg.}$
Argument of perigee	:	$178 \pm 0.2 \text{ deg.}$
Launch Azimuth	:	106 deg

## Vehicle Configuration

$(4\text{L40H} + \text{S139}) + \text{L37.5H} + \text{C12}$		
Vehicle height	:	49.128m
Lift off mass	:	414.75t
Stages	:	3
First stage (GS1)	:	S139+4L40H
Second stage (GS2)	:	L37.H
Third stage (GS3)	:	C12



Cryo Stage (C12)

## Major changes from GSLV-F01

- Launch from Second Launch Pad ■ Remote Fill and Drain System (RFDS) in GS2
- Remote Mounting Safe Arm (RMSA) for retro rocket ignition
- Telemetry changed to 2 chains from 4 ■ Re-engagable LHRS
- S139 Nozzle without SITVC Ports.

## INSAT-4C salient features

INSAT-4C



Satellite under preparation

Size	: 1.65X1.53X2.4m cuboid (Launch Configuration)	Payload	: 10/12 Channel High Power Ku-Band Transponders
Lift off Mass	: 2180 kg	Ku-Band Beacon Transmitter	: 2.2mx2m Offset Shaped Reflector Antenna (Tx) East side
Bus Configuration	: Standard I2K with stretched propellant tanks	Onboard Power Generation	: 1.4m Offset Shaped Reflector Antenna (Rx) West side
Location in orbit	: 74 ° East	Battery	: 2867 W (2 wing solar array with 2 panels per wing)
Mission life	: 10 years	Deployed Configuration size	: 2 x 70 Ah nickel hydrogen
		On-orbit Attitude Control	: North-South 9450 mm
			: East-West 5950 mm
			: Momentum biased 3-axis stabilized mode
			: Bipropellant – MMH, MON-3

# Additional Qualification Tests for SLP Launch



CSFM Test



L 40 mockup test



Wind tunnel test

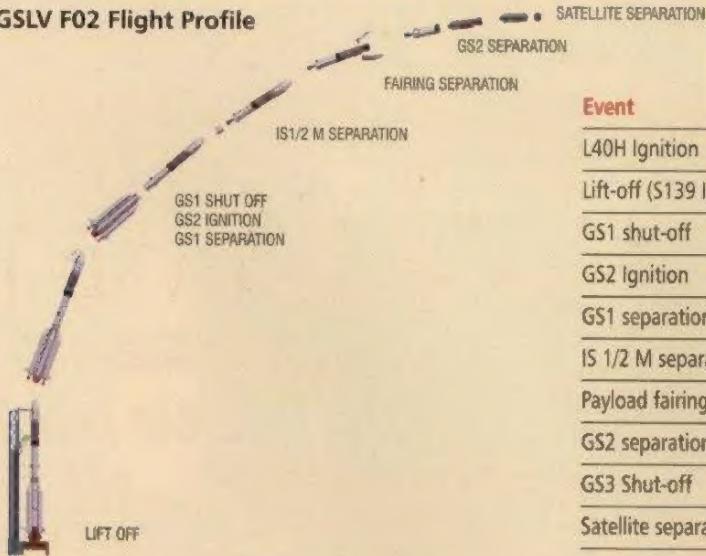


CBS structural test

## Flight Sequence

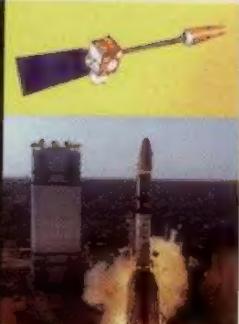
The overall flight sequence is given highlighting the nominal time, altitude and inertial velocity at critical flight events. Actual time of occurrence can vary since they are decided onboard.

**GSLV F02 Flight Profile**



Event	Time(s)	Altitude(km)	Velocity(km/s)
L40H Ignition	-4.8	0.0	0.45
Lift-off (S139 Ignition)	0.0	0.0	0.45
GS1 shut-off	147.5	68.8	2.82
GS2 Ignition	148.1	69.1	2.82
GS1 separation	149.7	70.4	2.82
IS 1/2 M separation	155.5	74.7	2.88
Payload fairing separation	228.9	115.0	3.91
GS2 separation	290.6	131.9	5.38
GS3 Shut-off	1000.5	218.5	10.22
Satellite separation	1015.5	231.9	10.22

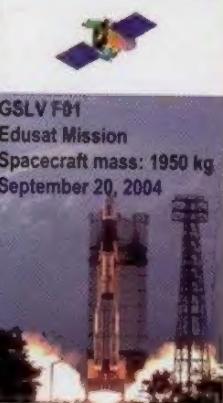
## Earlier Flights



GSLV D1/G-Sat 1 Mission  
Spacecraft mass: 1540 kg  
April 18, 2001



GSLV D2/G-Sat 2 Mission  
Spacecraft mass: 1823 kg  
May 8, 2003



GSLV F01  
Edusat Mission  
Spacecraft mass: 1950 kg  
September 20, 2004



GS1 Segment assembly



L 40H assembly



L 40H & S139 assembled



GS2 assembly



Cryo stage assembly



Vehicle mockup movement to UT



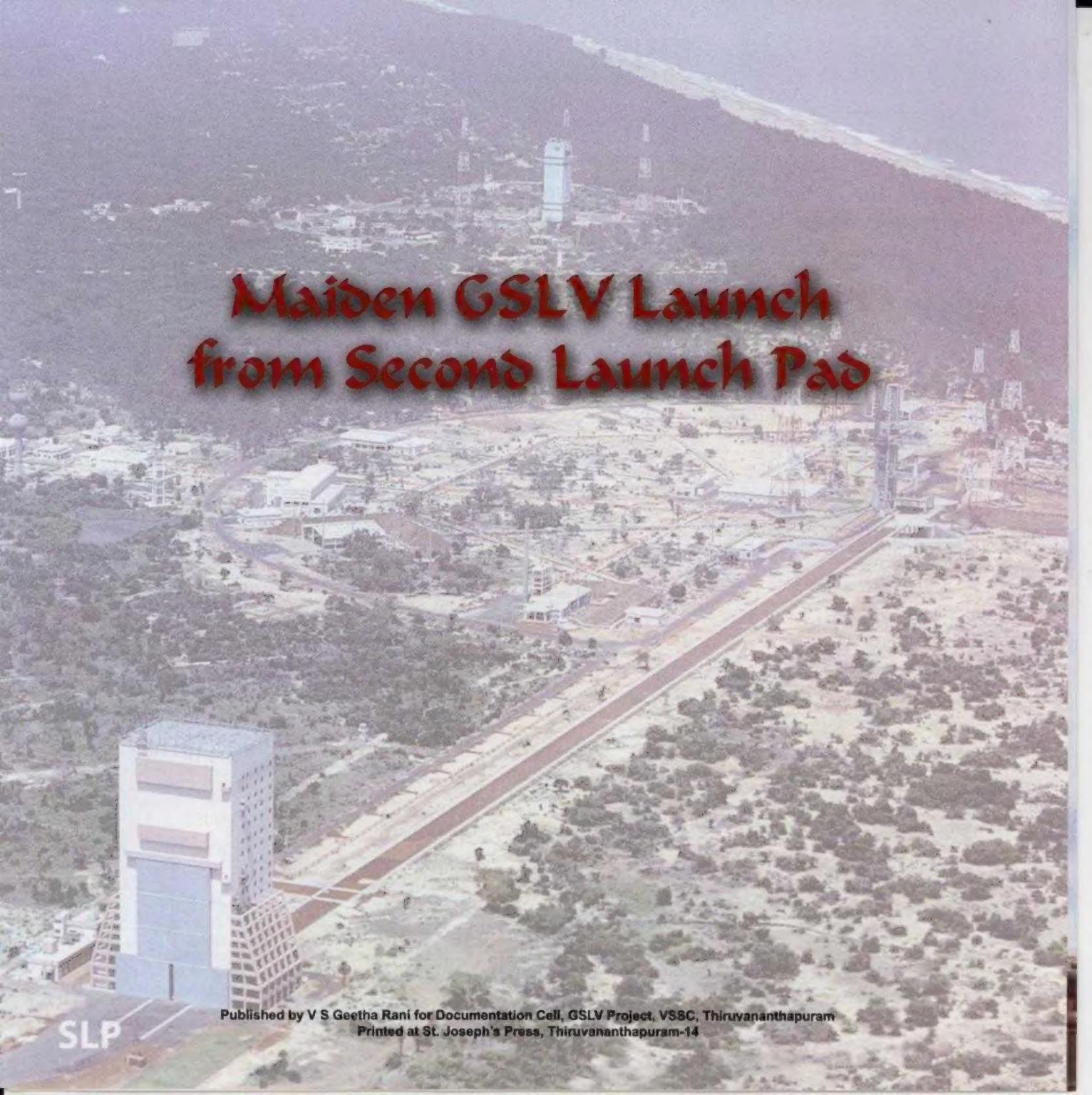
Equipment bay assembled to vehicle



Encapsulated assembly

**GSLV F02**  
**Vehicle Stacking**  
**at**  
**VAB-SLP**





# Maiden GSLV Launch from Second Launch Pad

SLP

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